Mathematics for Business and Industry

Course Overview:
This course enables the student to explore mathematical content for personal, business, and industrial use. Math concepts and skills are applied through study and problem-solving activities in real-world situations in the following areas: banking, measurement, borrowing and investing, consumer purchases, and financial management. Appropriate business forms are used in each unit. Leadership development will be provided through FBLA or DECA.

Guiding/Essential Questions:

- **What roles do math skills play in career opportunities?**
- Use the touch method on electronic calculators to solve real-world mathematical problems which relate to business and industry.
- Use mathematical operations to enable students to understand gross and net income and different methods of earning income.
- Research and analyze career opportunities requiring application of math skills.
- Demonstrate employability and social skills relative to the career cluster.
- Utilize activities of FBLA as an integral component of course content and leadership development.

- **What is the importance of using technology (including but not limited to electronic calculator, pc, etc.) in computing interest, finance charges, installments, and salary calculations.**

- Use calculators to solve real world mathematical problems which relate to business and industry.
- Apply math and communication skills with the technical content.
- Use mathematical operations to enable students to understand gross and net income and different methods of earning income.
- Demonstrate mathematical reasoning in figuring and recording checking and savings account transactions.
- Use mathematical reasoning to compare cash purchases, credit cards, charge accounts, markups, and discounts.
- Demonstrate mathematical reasoning in calculating various types of loans, investments, and interest, including compound interest.

- **What is the importance of maintaining records of personal financial accounts?**
- Use mathematical operations to enable students to understand gross and net income and different methods of earning income.
- Demonstrate mathematical reasoning in figuring and recording checking and savings account transactions.
- Use mathematical reasoning to compare cash purchases, credit cards, charge accounts, markups, and discounts.
- Demonstrate mathematical reasoning in calculating various types of loans, investments, and interest, including compound interest.
- Design and manipulate spreadsheets and graphs according to the availability of technology.

- Use mathematical problem solving to figure the costs involved in purchasing and maintaining a vehicle and a home and the methods of figuring depreciation.
- Identify and compare various types of insurance.

- **How do you make sound consumer decisions in relation to purchasing and investing?**
- Use mathematical operations to enable students to understand gross and net income and different methods of earning income.
- Demonstrate mathematical reasoning in calculating various types of loans, investments, and interest, including compound interest.
- Use mathematical problem solving to figure the costs involved in purchasing and maintaining a vehicle and a home and the methods of figuring depreciation.
- Identify and compare various types of insurance.
- Utilize activities of FBLA as an integral component of course content and leadership development.

- **How do you relate mathematical applications to managerial relations?**
- Use the touch method on electronic calculators to solve real-world mathematical problems which relate to business and industry.
- Apply math and communication skills within the technical content.
- Use mathematical operations to enable students to understand gross and net income and different methods of earning income.
- Recognize the opportunity to participate in Future Leaders of America as a productive group member.
- Use mathematical reasoning to compare cash purchases, credit cards, charge accounts, markups, and discounts.
- Design and manipulate spreadsheets and graphs according to the availability of technology.
- Demonstrate mathematical reasoning relating to personnel, production, sales, marketing, warehousing, and distribution.
- Demonstrate employability and social skills relative to the career cluster.
- Utilize activities of FBLA as an integral component of course content and leadership development.

Contributions by:

Rita Daniels, Business Education Teacher, Greenwood High School
Jeanne Meece, Math Teacher, Greenwood High School
Deniece Coke, Business Education Teacher, Spencer County High School
Mary Baldock, Math Teacher, Spencer County High School
Ann Bartosh, Math Consultant, Kentucky Department of Education
Nancy Graham, Business Education Consultant, Kentucky Department of Education
Steve Small, Business Education Consultant, Kentucky Department of Education

Mathematics for Business and Industry

Academic Expectations	Guiding Questions	Math Core Content	Correlation to the Program of Studies	Sample Activities	Sample Extensions for Multi-Level Classrooms
Goal 1: Students are able to use basic communication and mathematics skills for purposes and situations they will encounter throughout their lives. **1.1 –** Students use reference tools such as dictionaries, almanacs, encyclopedias, and computer reference programs and research tools such as interviews and surveys to find the information they need to meet specific demands, explore interests, or solve specific problems. **1.5-1.9 -** Students use mathematics	What roles do math skills play in career opportunities?	**Students will** **MA-H- 1.1.1** describe properties of, define, give examples of, and apply real numbers to both real-world and mathematical situations, and understand that irrational numbers, cannot be represented by terminating or repeating decimals. **MA-H-1.2.1** perform addition, subtraction, multiplication, and division with real numbers in problem-solving situations to specified accuracy. **MA-H-1.2.2** simplify real number expressions such	**Students will** • use the touch method on electronic calculators to solve real-world mathematical problems which relate to business and industry. • use mathematical operations to enable students to understand gross and net income and different methods of earning income. • research and analyze	**Students will** • job shadow a person in a position related to their career cluster and will demonstrate in a PowerPoint presentation the description of the job with an emphasis on the math skills being utilized – i.e. calculate depreciation of equipment, compute simple/compound interest, bank statement reconciliation, and payroll: W4, Wages, Taxes, Benefits, Garnishments, Deductions, Retirement Benefits (Various Careers) • calculate the number of supervisors needed at a ratio of one supervisor per 12 employees for a specific number of employees (Managers) • analyze financial statements and calculate current ratio,	• Students of multi-levels may be grouped for the job shadow experience • Research companies in the community and compare ratios of supervisors per employees • Visit the U.S. Department of Labor website to obtain labor statistics • Have students gather their own data to calculate standard deviation

mathematics ideas and procedures to communicate, reason, and solve problems. **1.16** – Students use computers and other kinds of technology to collect, organize, and communicate information and ideas. **Goal 2: Students shall develop their abilities to apply core concepts and principles from mathematics, the sciences, the arts, the humanities, social studies, practical living studies, and vocational**		expressions such as those containing opposites, reciprocals, absolute values, exponents (integer), roots (square, cube), and factorials. **MA-H-1.3.2** understand how real number properties(identify, inverse, commutative, associative, distributive, closure) are used to simplify expressions and solve equations. **MA-H-1.3.3** understand how to use equivalence relations (reflexive, symmetric, transitive) and order elations (less than, greater than, equal to) to solve	career opportunities requiring application of math skills. • demonstrate employability and social skills relative to the career cluster. • utilize activities of FBLA as an integral component of course content and leadership development.	debit-equity ratio, return on capital, etc. (Accountant) • calculate the standard deviation of the mean of the number of defective products out of a sample number tested (Quality Control Supervisor) • explore dependent and independent variables by calculating things such as gross pay with hours worked (Payroll Clerk) • write and solve equations with two variables such as calculating gross pay based on salary plus commission (Sales Position)	• Prepare for the FBLA Job Interview competitive event

studies to what they will encounter throughout their lives. **2.7** – Students understand number concepts and use numbers appropriately and accurately. **2.8** – Students understand various mathematical procedures and use them appropriately and accurately. **2.36** – Students use strategies for choosing and preparing for a career.		problems using real numbers. **MA-H-1.34** understand how ratio and proportion can be used in a variety of mathematical contexts, and to solve real-world problems. **MA-H-3.1.1** understand how standard deviation measures the scatter of a discrete set of real-world data. **MA-H-3.1.2** recognize that curve fitting (linear, quadratic, exponential) can be used as a method of describing and predicting from a set of data or scatter plot. Students will recognize the appropriate curve			

		appropriate curve for a particular set of data. **MA-H-3.2.1** analyze, interpret results, make decisions, and draw conclusions based on a set of data. **MA-H-3.2.2** plot a set of bivariate data and select an appropriate curve (linear, quadratic, exponential) of best fit. **MA-H-3.2.3** organize, display, and interpret statistical models (tables, graphs) of bivariate data. **MA-H-3.3.1** understand how outliers affect measures of central tendency. **MA-H-3.3.4** use data and curve of best fit to make			

		and defend predictions. **MA-H-4.1.1** understand the concept of a function and roles of independent and dependent variables. **MA-H-4.2.1** solve linear equations and linear inequalities. **MA-H-4.2.4** create tables of numerical values of functions including linear, quadratic, absolute value, exponential, and simple piecewise such as some long distance phone rates. **MA-H-4.3.1** write and solve linear equations describing real-world situations. **MA-H-4.3.2** understand how formulas, tables, graphs, and equations lf functions relate to each other.			

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Academic Expectations	Guiding Questions	Math Core Content	Correlation to the Program of Studies	Sample Activities	Sample Extensions for Multi-Level Classrooms
Goal 1: Students are able to use basic communication and mathematics skills for purposes and situations they will encounter through their lives. **1.5-1.9** – Students use mathematics ideas and procedures to communicate, reason, and solve problems. **1.16** – Students use computers and other kinds of technology to collect, organize, and communicate information and ideas.	What is the importance of using technology (including but not limited to electronic calculator, pc, etc.) in computing • interest • finance charges • installments • salary calculations	**Students will** **MA-H-1.1.1** describe properties of, define, give examples of, and apply real numbers to both real-world and mathematical situations, and understand that irrational numbers cannot be represented by terminating or repeating decimals. **MA-H-1.2.1** perform addition, subtraction, multiplication, and division with real numbers in problem	**Students will** • use calculators to solve real world mathematical problems which relate to business and industry. • Apply math and communication skills within the technical content. • Use mathematical operations to enable students to understand gross and net income and different methods of earning income. • Demonstrate mathematical reasoning in	**Students will** • apply real numbers to real world situations in relation to calculating income, maintaining checking and savings accounts, taxes, interest, elapsed time, making change, and fractional parts of a year utilizing a spreadsheet software and the electronic calculator. • learn about inequalities by calculating social security deductions utilizing spreadsheet software. • calculate a finance charge on a store credit card using the ratio of $18.90 per $100 of merchandise and compare the cash purchase price • investigate rates of change, for example, population increases and decreases over time or salary increases and decreases over time. Use the TI-83 to graph and make predictions.	• Have students do a simulation and project the value of an IRA in the year 2030. • Guest speakers: insurance agents, financial planners, bank managers, accountants, stock brokers • Students will research social security and prepare a PowerPoint presentation about its future. Students will then prepare a letter using word

Goal 2: Students shall develop their abilities to apply core concepts and principles from mathematics, the sciences, the arts, the humanities, social studies, practical living studies, and vocational studies to what they will encounter throughout their lives. **2.7** – Students understand number concepts and use numbers appropriately and accurately. **2.8** – Students understand various mathematical procedures and use them appropriately and accurately. **2.10** – Students understand measurement		problem-solving situations to specified accuracy. **MA-H-1.3.3** understand how to use equivalence relations (reflexive, symmetric, transitive) and order relations (less than, greater than, equal to) to solve problems using real numbers. **MA-H-1.3.4** understand how ratio and proportion can be used in a variety of mathematical contexts and to solve real-world problems. **MA-H-3.2.1**	figuring and recording checking and savings account transactions. • Use mathematical reasoning to compare cash purchases, credit cards, charge accounts, markups, and discounts • Demonstrate mathematical reasoning in calculating various types of loans, investments, and interest, including compound interest. • Design and manipulate spreadsheets and graphs according to the availability of technology.	• be directed to a website that contains a graph and will interpret, draw conclusions, and answer predetermined questions. • use TI-83 or spreadsheet software to organize two variable data into a table and graph for display and interpretation. • design a spreadsheet that will compute the earnings of a salesperson that are paid monthly on a graduated commission basis. The spreadsheet will include formulas that use subtraction, multiplication, the IF function, and the SUM function. • compile a list of costs associated with purchasing a home or car and calculate the depreciation expenses, monthly payment, insurance, etc.	processing software to send to elected government officials. • Prepare a Job Description Manual for FBLA.

measurement concepts and use measurement appropriately and accurately.		analyze, interpret results, make decisions, and draw conclusions based on a set of data. **MA-H-3.2.3** organize, display, and interpret statistical models (tables, graphs) of bivariate data. **MA-H-4.1.1** understand the concept of a function and roles of independent and dependent variables.	• Use mathematical problem solving to figure the costs involved in purchasing and maintaining a vehicle and a home and the methods of figuring depreciation		

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Goal 1: Students are able to use basic communication and mathematics skills for purposes and situations they will encounter throughout their lives. **1.5-1.9** – Students use mathematical ideas and procedures to communicate, reason, and solve problems. **1.16** – Students use computers and other kinds of technology to collect, organize, and communicate information and ideas.	What is the importance of maintaining records of personal financial accounts?	**Students will** **MA-H-1.1.1** describe properties of, define, give examples of, and apply real numbers to both real-world and mathematical situations, and understand that irrational numbers cannot be represented by terminating or repeating decimals. **MA-H-1.2.1** perform addition, subtraction, multiplication, and division with real numbers in problem	**Students will** • use mathematical operations to enable students to understand gross and net income and different methods of earning income. • demonstrate mathematical reasoning in figuring and recording checking and savings account transactions. • use	**Students will** • use real number properties to reconcile a bank statement and check register. The equation is Adjusted Balance = Statement Balance – Outstanding Checks + Outstanding Deposits • use a linear inequality to determine the maximum number of checks that can be written in a month to avoid finance charges of a predetermined amount. Sample: .10 (x-10) + $4≤ $8 where x is the number of checks written. • calculate interest in two ways: simple and compound of an initial investment over a set amount of time. Graph and select a curve of best fit of the following: simple interest vs. time and then compound interest over time. • calculate a function identifying the dependent and independent	• Analyze your phone bill and determine what type of long distance service you will need. Research MCI, BellSouth, or ATT and determine which phone service you would use. • Develop a personal financial plan • Guest Speaker: Insurance agent that will share information about various types of insurance • *The Secret of Becoming a Millionaire*

Goal 2: Students shall develop their abilities to apply core concepts and principles from mathematics, the sciences, the arts, the humanities, social studies, practical living studies, and vocational studies to what they will encounter throughout their lives. **2.7 –** Students understand number concepts and use number appropriately and accurately. **2.8** – Students understand various mathematical procedures and use them appropriately and accurately. **2.11** – Students understand mathematical		problem-solving situations to specified accuracy **MA-H-1.3.2** understand how real number properties (identify, inverse, commutative, associative, distributive, closure) are used to simplify expressions and solve equations. **MA-H-1.3.3** understand how to use equivalence relations (reflexive, symmetric, transitive) and order relations (less than, greater than, equal to) to solve problems using real	mathematical reasoning to compare cash purchases, credit cards, charge accounts, markups, and discounts. • demonstrate mathematical reasoning in calculating various types of loans, investments, and interest, including compound interest. • design and manipulate spreadsheets and graphs according to the availability	variables, i.e. unit price = price per time divided by measure or count • write a two variable equation to represent the amount of a leasee payment if the lease must pay $17 per $1,000. EXAMPLE: x = lease payment, y = total cost of car x = $17.00 (y/1000) • produce a spreadsheet that shows how formulas, tables, graphs, and equations of functions relate to each other; such as, calculation of average daily balance and finance charge • calculate the lowest percent of salary increase one can receive before moving to a higher tax bracket	*Millionaire (simulation),* Money Math: Lessons for Life by Mary C. Suiter and Sarapage M. Corkle

mathematical change concepts and use them appropriately and accuracy. **2.12** – Students understand mathematical structure concepts mathematical sustems.		using real numbers **MA-H-1.3.4** understand how ratio and proportion can be used in a variety of mathematical contexts and to solve real-world problems. **MA-H-3.2.1** analyze, interpret results, make decisions, and draw conclusions based on a set of data. **MA-H-3.2.2** plot a set of bivariate data and select an appropriate curve (linear, quadratic, exponential) of best fit. **MA-H-3.2.3** organize,	of technology. • use mathematical problem solving to figure the costs involved in purchasing and maintaining a vehicle and a home and the methods of figuring depreciation. • identify and compare various types of insurance.		

		display, and interpret statistical models (tables, graphs) of bivariate data. **MA-H-4.1.1** understand the concept of a function and roles of independent and dependent variables. **MA-H-4.2.1** solve linear equations and linear inequalities. **MA-H-4.3.1** write and solve linear equations describing real-world situations**.** **MA-H-4.3.2** understand how formulas, tables, graphs, and equations of functions arising from real-world situations			

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procedures and use them appropriately and accurately. **2.10** – Students understand measurement concepts and use measurement appropriately and accurately. **2.11** – Students understand mathematical change concepts and use them appropriately and accurately.		(less than, greater than, equal to) to solve problems using real numbers. **MA-H-1.3.4** Students will understand how ratio and proportion can be used in a variety of mathematical contexts and to solve real-world problems. **MA-H-3.1.1** Students will understand how standard deviation measures the scatter of a discrete set of real-world data. **MA-H-3.1.2** Students will recognize that curve fitting (linear,			

		quadratic, exponential) can be used as a method of describing and predicting from a set of data or scatter plot. Students will recognize the appropriate curve for a particular set of data. **MA-H-3.2.1** Students will analyze, interpret results, make decisions, and draw conclusions based on a set of data. **MA-H-3.2.3** Students will organize, display, and interpret statistical models (tables, graphs) of bivariate data. **MA-H-3.3.1** Students will understand how outliers affect measures of central tendency.			

		MA-H-3.3.4 Students will use data and curve of best fit to make and defend predictions. **MA-H-4.1.1** Students will understand the concept of a function and roles of independent and dependent variables. **MA-H-4.2.4** Students will create tables of numerical values of functions including linear, quadratic, absolute value, exponential, and simple piecewise such as some long distance phone rates.			

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mathematics, the sciences, the arts, the humanities, social studies, practical living studies, and vocational studies to what they will encounter throughout their lives. **2.7** – Students understand number concepts and use numbers appropriately and accurately. **2.8** – Students understand various mathematical procedures and use them appropriately and accurately. **2.10** – Students understand measurement concepts and use measurement appropriately and accurately.		numbers in problem-solving situations to specified accuracy. **MA-H-1.3.2** Students will understand how real number properties (identify, inverse, commutative, associative, distributive, closure) are used to simplify expressions and solve equations. **MA-H-1.3.3** Students will understand how to use equivalence relations (reflexive, symmetric, transitive) and order relations (less than,	opportunity to participate in Future Leaders of America as a productive group member. • use mathematical reasoning to compare cash purchases, credit cards, charge accounts, markups, and discounts. • design and manipulate spreadsheets and graphs according to the availability of technology. • demonstrate mathematical applications relating to personnel, production, sales, marketing, warehousing, and distribution.	uses to calculate a piece-rate gross pay where *n* represents the number of completed units, *r* represents the pay rate per unit, and *G* represents gross pay. Use the formula to find gross pay for 415 envelopes stuffed a rate of $.20 each. • plot data on years of post secondary education vs. salary (in thousands). Draw a curve of best fit. Use this curve to make predictions. Refer to Salary Expectations – Mathematics released open response. • prepare a business plan for the FBLA competitive event. • prepare a spreadsheet to calculate net price and cash price based on discounts.	

		greater than, equal to) to solve problems using real numbers. **MA-H-1.3.4** Students will understand how ratio and proportion can be used in a variety of mathematical contexts and to solve real-world problems. **MA-H-3.2.1** Students will analyze, interpret results, make decisions, and draw conclusions based on a set of data. **MA-H-3.2.2** Students will plot a set of bivariate data and select an appropriate	• demonstrate employability and social skills relative to the career cluster. • utilize activities of FBLA as an integral component of course content and leadership development.		

		curve (linear, quadratic, exponential) of best fit. **MA-H-3.2.3** Students will organize, display, and interpret statistical models (tables, graphs) of bivariate data. **MA-H-4.1.1** Students will understand the concept of a function and roles of independent and dependent variables. **MA-H-4.2.1** Students will solve linear equations and linear inequalities. **MA-H-4.3.1** Students will write and solve			

		linear equations describing real-world situations. **MA-H-4.3.2** Students will understand how formulas, tables, graphs, and equations of functions relate to each other.			